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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,572	06/17/2005	Bertrand Viellerobe	17452/017001	4337
22511	7590	06/30/2011		
OSHA LIANG L.L.P. TWO HOUSTON CENTER 909 FANNIN, SUITE 3500 HOUSTON, TX 77010			EXAMINER WERNER, DAVID N	
			ART UNIT 2483	PAPER NUMBER
			NOTIFICATION DATE 06/30/2011	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@oshaliang.com  
hathaway@oshaliang.com  
kennedy@oshaliang.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/539,572	<b>Applicant(s)</b> VIELLEROBE ET AL.	
	<b>Examiner</b> DAVID N. WERNER	<b>Art Unit</b> 2483	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 June 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20100924</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. The Art Unit location of your application in the U.S.P.T.O. has changed. To assist in expediting prosecution, please address all communications regarding this action to Art Unit 2483.
2. This Office action for U.S. Patent Application no. 10/539,572 is responsive to the Request for Continued Examination filed 4 June 2010, in reply to the Final Rejection of 4 February 2010. Claims 1–24 are pending.
3. In the Final Rejection, Claims 1–15 and 17–24 were rejected under 35 U.S.C. § 103(a) as obvious over "New SNOM sensor using optical feedback in a VCSEL-based compound cavity" ("Gorecki") in view of "Parallel confocal laser microscope system using smart pixel arrays" ("Narusé"). Claim 16 was rejected under 35 U.S.C. § 103(a) as obvious over Gorecki in view of Narusé and in view of "Simple reflection Scanning Near-field Optical Microscope using the back reflected light inside the laser cavity as detection mode" ("Schwarz").

### ***Continued Examination Under 37 CFR 1.114***

4. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous

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Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4 June 2011 has been entered.

### ***Response to Arguments***

5. Applicant's arguments have been fully considered. The rejection is amended to show that the Narusé reference discloses the claimed lens, as shown in fig. 5, and achieves confocal imaging, as claimed. The Gorecki reference is now relied on as a secondary reference to show it would have been obvious to place a photodetector on the face of the VCSEL lasers, as claimed. This revision of the prior art rejection is substantive enough to be considered a new ground of rejection, and so this Office action is non-final.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1–15 and 17–24 rejected under 35 U.S.C. 103(a) as being unpatentable over M. Narusé & M. Ishikawa, "Parallel confocal laser microscope system using smart pixel arrays", 4092 Proc. of SPIE 94–101 (Oct. 2000) in view of

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C. Gorecki, S. Khalfallah, H. Kawakatsu & Y. Arakawa, "New "NOM sensor using optical feedback in a VCSEL-based compound-cavity", 87 Sensors & Actuators A 113–125 (Dec. 2000).

Narusé teaches a confocal laser microscope. Regarding Claim 1, fig. 1 of Narusé illustrates a simplified diagram of a confocal microscope. As shown in fig. 1, the Narusé microscope includes a VCSEL array, as claimed. The light emitted from the VCSEL array passes through an "optical system" and is reflected off the specimen. Fig. 5 illustrates portions of this system in more detail, showing light from the VCSEL array refracted through a lens to reach the specimen. This is the claimed "lens". As is further shown in fig. 1 of Narusé, reflected light from the specimen passes through a "pinhole array" to be collected in an array of photodetectors and processing elements. This pinhole array comprises instances of the claimed openings used as filtering holes to achieve confocal imaging.

The present invention differs from Narusé in that in the present invention, the photodetectors are arranged on the face of the VCSEL arrays, whereas in Narusé, the photodetectors are placed to the side of the VCSEL arrays, with light from the specimen reaching the photodetectors through a half mirror.

Gorecki teaches a microscope head or sensor comprising a VCSEL laser. Regarding Claim 1, as shown in fig. 4 of Gorecki, on the rear of a VCSEL, at the top of a diagram, a PIN detector detects light reflected off a sample and back into the VCSEL cavity. Gorecki, p. 116: col. 1. Then, the Gorecki sensor has a photodetector

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arranged on a face of a VCSEL that receives a light beam originating from the subject via the laser cavity. Compare fig. 4a of the specification of the present application with fig. 4 in Gorecki.

Narusé discloses the claimed invention except for placing a photodetector on a VCSEL face. Gorecki teaches that it was known to integrate a photodetector on a VCSEL. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to modify the Narusé VCSEL microscope to place the photodetectors on each VCSEL, rather than in a separate array, as taught by Gorecki, since Gorecki states in pg. 114, col. 1 that such a modification would allow more light reflected into the microscope system from the relatively weak VCSEL illumination source to be detected.

Regarding Claim 2, as shown in figure 4 of Gorecki, the cavity opening of the VCSEL is positioned on the bottom of the laser, and the PIN detector is positioned on top of the laser, or opposite the cavity opening, as claimed.

Regarding Claim 3, in Gorecki, the VCSEL-based sensor is designed to be mounted on a "scanning piezoelectric cantilever" (p. 122: col. 2) or "positioner" that moves the sample (p. 116: col. 2; p. 118: col. 1). This is the claimed "scanning means".

Regarding Claim 4, the multiple VCSEL sensors in Narusé are specifically designed to facilitate real-time imaging, as claimed. Narusé at 96.

Regarding Claims 5 and 6, both Narusé (fig. 6) and Gorecki (p. 116: col. 2) specify that the specimen is mounted on a piezoelectric stage, commonly considered to be a Micro-Electro-Mechanical Systems (MEMS) component.

Regarding Claims 7 and 8, in Narusé, the scanning process may be embodied as a process of moving the "optical system" so that the entire specimen is covered.

Regarding Claims 9 and 10, the Gorecki microscope head design is described in page 116: column 1 as back-scattering reflected light from the subject through the VCSEL cavity to the PIN detector, and causing a "power modulation" of light energy with the sample surface.

Regarding Claim 11, in Narusé, the array of plural photodetectors is the claimed "synchronous detection means".

Regarding Claim 12, in the combination of Narusé and Gorecki, if the microscope, including a lens, as claimed, is placed on a miniature head as in Gorecki, if the microscope moves to scan on a z-axis for three-dimensional scanning (Narusé at p. 96, Gorecki at p. 118: col. 1), the lens is mobile, as claimed.

Regarding Claim 13, the examiner takes Official Notice that it was well-known in the art to use variable-curvature, or aspheric lenses, as claimed, to eliminate the spherical aberration thus improving image clarity for image formed from passing light through the lens.

Regarding Claim 14, Narusé describes three-dimensional scanning, including scanning along a z-axis. Narusé at p. 96. Gorecki describes an experimental setup

in which the “z-scan” or distance between the VCSEL and subject is variable, as claimed. Gorecki, p. 118: col. 1.

Regarding Claim 15, in Gorecki, the IC microhead comprising the PIN detector and the VCSEL, as shown in fig. 4 is the claimed “miniature head in the form of a housing”.

Regarding Independent Claim 17, as mentioned above with respect to claim 1, in Narusé, the VCSEL array discloses the claimed steps of emitting the plurality of light beams, focusing the light beams with a lens, and, as modified by Gorecki, receiving the light beams with a photodetector arranged on each VCSEL laser face.

Regarding Claim 18, Narusé is described as scanning the specimen by either moving the specimen beneath a stationary device or moving the device over a stationary specimen (p. 95), thus "scanning" as claimed.

Regarding Claim 19, the multiple VCSEL sensors in Narusé are specifically designed to facilitate real-time imaging, as claimed. Narusé at 96.

Regarding Claims 20 and 21, in Narusé, the scanning process may be embodied as a process of moving the “optical system” so that the entire specimen is covered. Narusé at 95.

Regarding Claims 22 and 23, both Narusé (fig. 6) and Gorecki (p. 116: col. 2) specify that the specimen is mounted on a piezoelectric stage, commonly considered in the art to be a Micro-Electro-Mechanical Systems (MEMS) component.



Regarding Claim 24, in Gorecki, the microscope head design is described in page 116: column 1 as causing a "power modulation" of light energy with the sample surface, as claimed. Additionally, the array of VCSELs in Naruse, modified to contain the backing photodetectors of Gorecki, carry out "synchronous detection" at the photodetector level, as claimed.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gorecki in view of Naruse as applied to claim 15 above, and further in view of U. Schwarz, M.L. Berthié, D. Courjon, & H. Bielefeldt, "Simple reflection Scanning Near-field Optical Microscope using the back reflected light inside the laser cavity as detection mode", 134 Optics Communications 301–309 (Jan. 1997) ("Schwartz"). Claim 16 is directed to placing a miniature head at the end of an endoscope. Naruse and Gorecki do not disclose this embodiment.

Schwarz teaches a laser microscope similar to that in Gorecki. Regarding Claim 16, in Schwarz, as shown in figs. 2, 3, and 5, the laser is connected to one end of an optical fiber, with the other end of the fiber, or tip, held near the sample. Schwarz at p. 303: col. 2. Then, Schwarz can be said to place a head at the end of an endoscope.

Naruse, in combination with Gorecki, discloses the claimed invention except for using an endoscope. Schwarz teaches that it was known to place the tip of a laser microscope at the end of a fiber. Therefore, it would have been obvious to one

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having ordinary skill in the art at the time of the invention to modify the laser microscope of Narusé or Gorecki to use the fiber of Schwarz, since Schwarz states in pg. 303: col. 2 that such a modification would enable fine control of the head near the sample.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID N. WERNER whose telephone number is (571)272-9662. The examiner can normally be reached on Monday-Saturday from 10:00 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph G. Ustaris can be reached on (571) 272-7383. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the

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/D. N. W./

Examiner, Art Unit 2483

/Dave Czekaj/

Primary Examiner, Art Unit 2483